Memorandum

To: Systems Development Center (SDC) Staff

From: Andy Meranda, MOSES Program Manager

Date: May 24, 2002

Subject: SDC Systems Engineering Environment (SEE) Policy Statement

References: (a) *Plan for Implementing a Systems Engineering Environment Appropriate to the Systems Development Center,* SDC-0055-003-SS-1002B, June 26, 1992

(b) Systems Development Center (SDC) Product Assurance (PA) Operations Guide, November 30, 2001

(c) SAIC *Software Development and Maintenance Policy,* SDMP-POL-100, April 18, 1994

(d) Software Engineering Institute (SEI) Capability Maturity Model (CMM) for Software, Version 1.1, February 1993, CMU/SEI-93-TR-24, ESC-TR-93-177

(e) Environmental Protection Agency (EPA) Information Technology Architecture Road Map, November 13, 1997

(f) Environmental Protection Agency 2100 Information Resources Management Policy Manual, Chapter 5, Data Standards

(g) Environmental Protection Agency Environmental Data Registry

Purpose

The SDC establishes this policy for institutionalizing the SEE that defines repeatable and consistent software system development practices. The SEE consists of two complementary components:

- *Application Development Process Environment (ADPE)S* the policies, guidelines, procedures, and standards defining the *processes* for developing products (i.e., documents and/or computer code and/or databases) within the SDC. The ADPE is the process framework for consistent product evolution.

- *Application Development Technology Environment (ADTE)S* the *technology* as embodied in hardware and software development tools, and associated procedures for their use, required to develop applications. These tools include Computer-Aided Systems Engineering (CASE) tools, programming language compilers, Local Area Network (LAN) application development tools, application development tools, data base management systems, Configuration Management (CM) tools, and project management tools.

The SDC development *processes* are contained in ADPE elements (i.e., policies, guidelines, procedures, and standards) and the SDC *technology* is contained in the ADTE plan and associated procedures.

SEE Institutionalization Policy

All SDC staff (i.e., SAIC employees and subcontractors) shall implement the ADPE elements and ADTE plan and procedures.

The SDC's commitment to this policy involves a Continuous Improvement Program (CIP) for SDC software systems development processes. The CIP enables every SDC staff member to participate in the evolution of SDC software systems development processes.

SEE Policy Scope

The SDC SEE Policy Statement applies to all SDC products and services described in a Statement of Work (SOW) and detailed in a project plan.

This policy's requirements are categorized by management, development, and PA policy requirements.

Management Policy Requirements:

- Management policy shall be based on the use of repeatable, documented, consistent processes to produce quality products.

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- Management philosophy shall be customer-oriented. SDC managers and employees will be aware of, understand, and account for EPA's point-of-view in all activities and products.

- SDC staff at all levels will be responsible for the protection of company and customer data, especially the treatment of "Sensitive Data." Sensitive data is defined as Confidential Business Information (CBI), Privacy Act data, or data that has been labeled explicitly by EPA as sensitive.

- The SDC shall use a consistent, documented process for managing all software projects. The consistent process shall define objectives, develop requirements with the customer's involvement, obtain the necessary commitments to meet the objectives, and ensure that software project activities are coordinated and compatible with overall project objectives.

- The SDC Development and Maintenance Methodology Group (DMMG) shall help implement management policy and development processes. Specific DMMG activities are listed under Development Policy Requirements below.

- Development policy shall be based on the use of repeatable, documented, consistent processes to produce quality products. The DMMG has overall responsibility for developing, coordinating and promulgating the ADPE.

- An independent PA Organization shall help develop high quality products and reduce the risks associated with product development. Specific PA activities are listed under PA Policy Requirements below.

- SAIC selects and manages subcontractors who support software systems development activities. The selected subcontractors shall be co-located with SDC team members. Subcontractors are integrated into SDC Development Teams. Contractual arrangements shall be made with each subcontractor in accordance with SAIC policy and procedures.

- The SDC shall establish and maintain a training program to build the skill base of the organization, and shall provide the skills and knowledge needed by personnel filling technical or management roles. A documented training plan implements this policy. The DMMG will manage the SDC training program and provide technical, process, and management training to assist in implementation of development policy and processes.

- Establish and maintain a process capability baseline that includes a description of the organization's standard software process, standard definitions of the measurements, and expected range of measurement values.

- Establish, implement, and maintain a plan to bring a project's software process under quantitative control.

- Management activities shall support the organization's commitment to improve software product quality.

Development Policy Requirements:

- The DMMG shall establish and help implement development processes, policies, guidelines, procedures, and standards via the SEE ADPE. The development process documentation shall include:

  - Planning, organizing, staffing, directing, and controlling of software development and maintenance projects.

  - Documenting requirements allocated to software, establishing a baseline, and managing changes throughout the system life cycle.

  - Procedures for definition and review of system-level requirements and project-level objectives by all affected functional groups.

  - Designing, coding, testing, conducting functional integration, preparing software documentation, and delivering the software products.

  - Tracking progress against documented plans, including technical, schedule, and cost performance.

- The DMMG shall establish a visible and documented CIP. SDC staff are responsible for reviewing, understanding, performing, and working to improve SDC processes. As the SDC product development capability matures, the development processes shall be improved. Lessons learned shall be used to improve the processes. The DMMG actively seeks to assess the effectiveness of ADPE elements. The DMMG coordinates and incorporates suggested improvements from SDC management, SDC staff, and EPA personnel to ensure continuous ADPE improvement.

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- SDC software deliverables shall be subjected to: (1) peer review, (2) independent PA, (3) technical editing (documents), and (4) project-level technical oversight.

- Projects that process or use sensitive data, where there is a possibility that a software error may result in this sensitive data being available to unauthorized users, will take specific measures to protect and prevent the inadvertent release of this data, including the following:

    - Projects identified as processing sensitive data shall specifically be identified as such in their respective project plan and shall incorporate these processes and requirements into the plan.

    - All software products, including life cycle documentation leading to software products and source code, will be formally peer reviewed by more than two people.

    - Peer reviews will be required for projects using CASE tool models and the source code, test scripts, and the test data they generate.

    - Test scripts will be prepared and executed for integration testing as well as PA testing and the results will become part of the project's Verifiable Objective Evidence (VOE).

    - Test scripts will be peer reviewed to ensure that they adequately cover scenarios that test the software's ability to prevent unauthorized release of sensitive data.

    - Test data will be peer reviewed to insure that it adequately includes dummy sensitive data exercised by the test scripts.

    - PA will periodically review the VOE of each project that processes or uses sensitive data and report to the Program Manager that policies pertaining to sensitive data are being followed.

- SDC Development Teams shall identify work products to undergo peer review in accordance with the SEE.

- The DMMG shall establish and maintain a set of organizational and software project metrics to provide a basis for understanding and assessing project cost, schedule, and quality of associated work products. These metrics shall be consistent with relevant portions of the Software Engineering Institute's (SEI) Software Capability Maturity Model (SW-CMM®).

- All software projects will support the organizational and project-level metrics collection, analysis, and reporting requirements established in the SEE.

- All software projects shall have a documented CM Program and associated plan that is effective throughout the product development life cycle. As a minimum, the plan shall provide for: (1) identifying items to be controlled, (2) controlling releases and changes of those items, (3) recording and reporting the status of those items and their associated change requests, and (4) verifying the completeness and correctness of those items through reviews and audits.

- SDC development processes shall be tailored for each project to address unique project requirements.

- SDC development processes shall be in compliance with contract requirements and follow applicable EPA standards (e.g., EPA 2100 Information Resource Management (IRM) Policy Manual, EPA Information Technology Architecture Road Map) and shall make use of the Environmental Data Registry to locate and use applicable data standards as well as to register data elements.

PA Policy Requirements:

- PA policy shall be based on the use of repeatable, documented, consistent processes to produce quality products.

- SDC Development Teams and PA staff shall work together to develop quality products through adherence to defined, repeatable processes that build quality into the project deliverables during each phase of development.

- The PA Organization is established, independent of the project reporting chain below the PM, to verify compliance with policies, guidelines, procedures, and standards of the SEE. The *SDC Product Assurance Operations Guide* contains PA Instructions (PAI) that serve as detailed procedures for the PA staff to carry out their day-to-day responsibilities. This guide is part of the SEE. PA activities shall include process and product Quality Assurance (QA), Verification and Validation (V&V), Test and Evaluation (T&E), and Configuration Management (CM) when requested by the TPL. PA staff and Technical Project Leaders (TPL) shall coordinate on project risk, cost estimates, and schedule.

- The PA organization will support the organization and project-level metrics collection, analysis, and reporting requirements established in the SEE.

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Deviations from Policy Requirements:

- Deviations or waivers from these policy requirements require approval by the SDC MOSES Program Manager.